



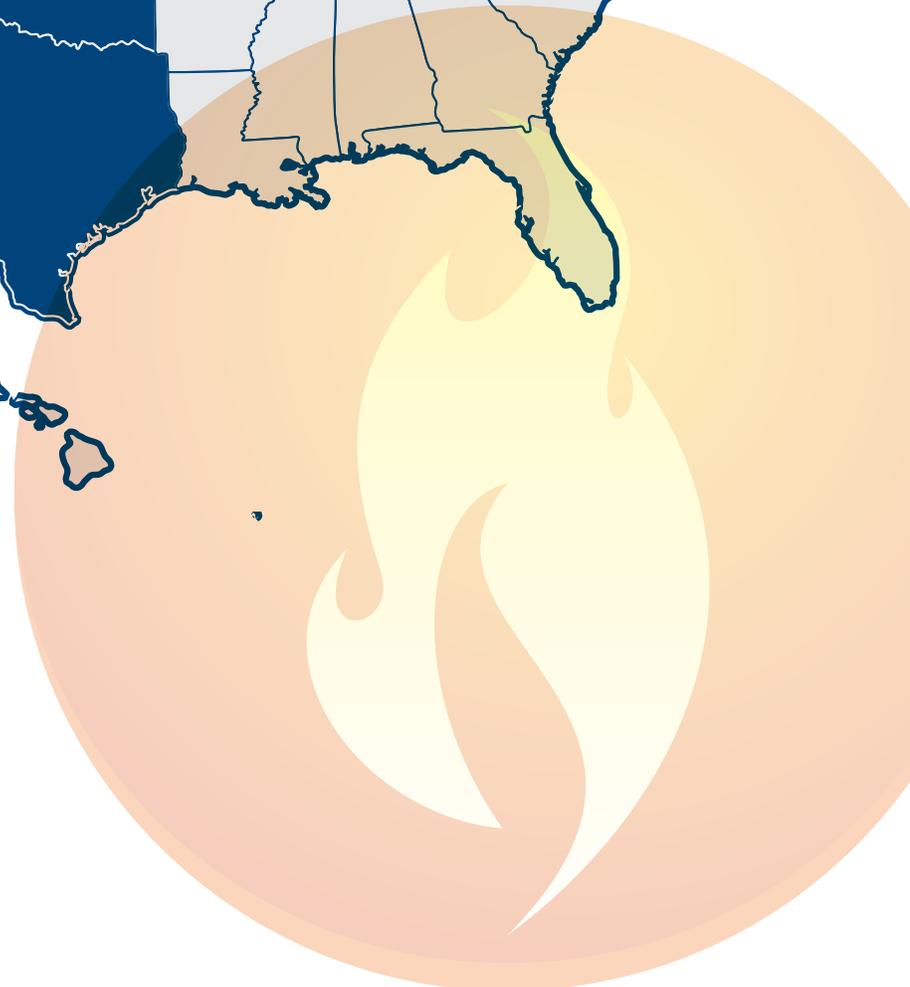
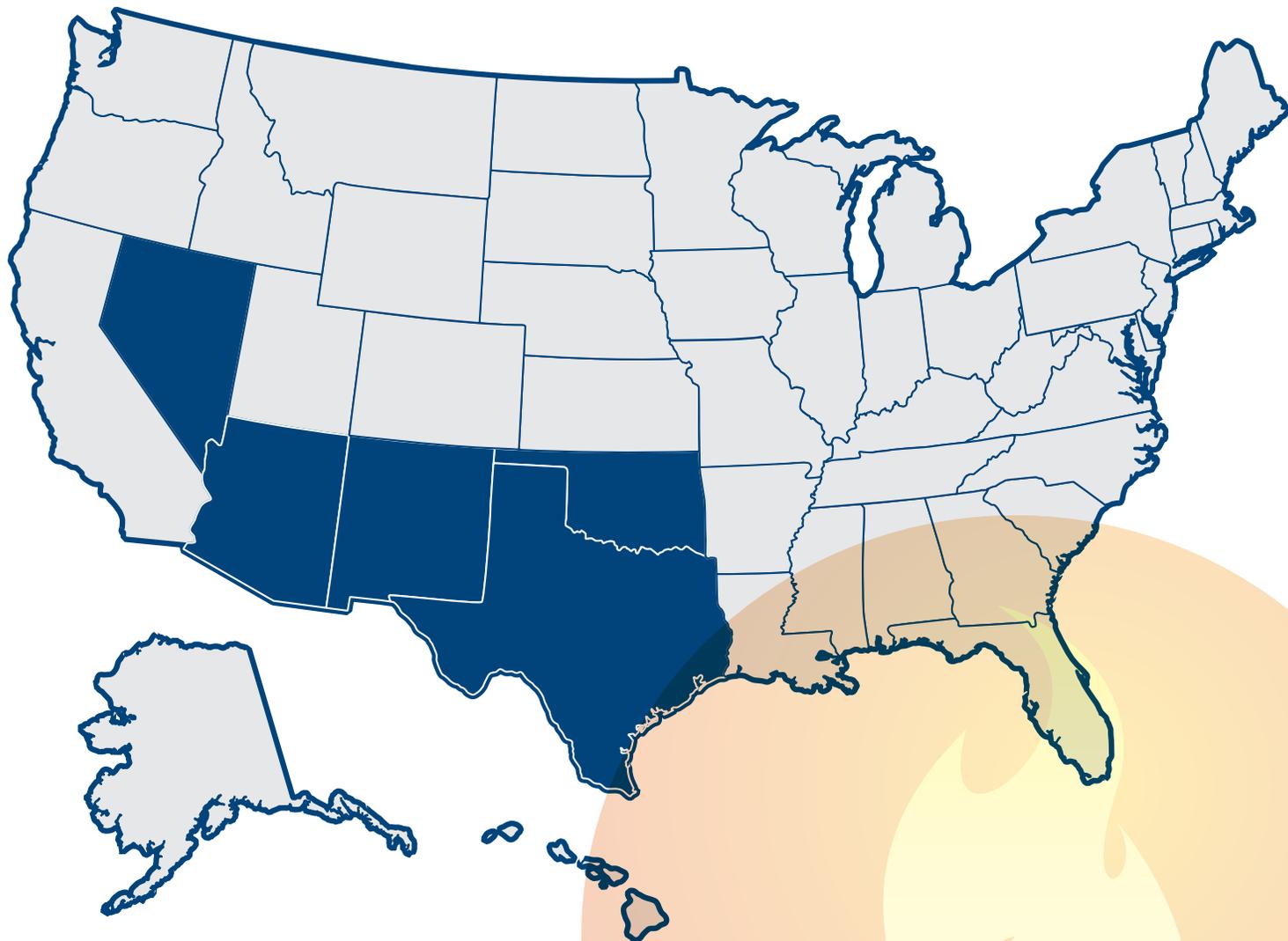
# Protect Your Property from Wildfire





# Table of contents

3	Introduction
4	Southwest Retrofit Guide
15	Property Assessment Checklist





## YOU CAN MAKE A DIFFERENCE

---

Prolonged drought conditions combined with hot, dry winds that commonly blow through the mountains and across the plains have left Arizona, Nevada, New Mexico, Oklahoma and Texas particularly vulnerable to wildfire conditions. As these areas are threatened by larger and more destructive fires, property owners are looking for solutions to reduce their risk of damage. This guide was created for the Southwest and takes into account local building styles and construction materials, common topographical characteristics and weather patterns, and other risk factors identified by fire science research. While wildfire protection begins with the individual, this research proves that a community-wide approach to fire protection is the most effective, so please share this guide with friends and neighbors. If something combustible is located within a 100-foot perimeter of your home or business, it could potentially put your property at risk. Everyone benefits from a wildfire-adaptive community.

Wildfire research has shown that individuals and families can protect their properties against wildfires by addressing three clear sources of vulnerability: the home or business itself, the landscaping near a building and the general vegetation in the area surrounding the building. Each of these sources can be dealt with through maintenance, structural improvements, and vegetation control. Many of these projects are affordable and can be done in a weekend. Some of the projects have an additional financial benefit: they can help improve the energy efficiency of your home or business.

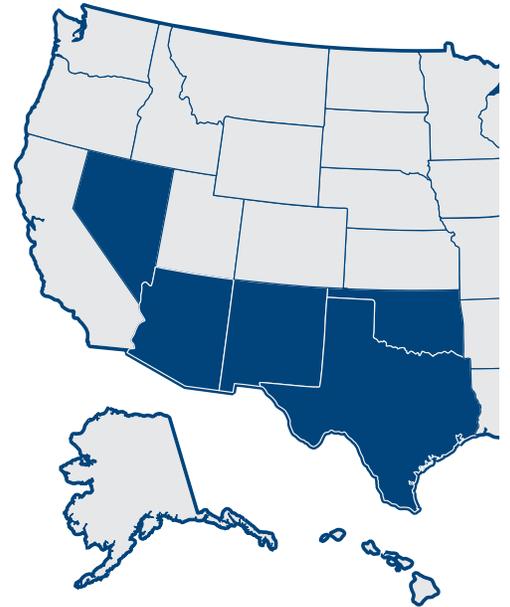
### UNDERSTANDING EFFECTIVE WILDFIRE PROTECTION

Wildfires are called wild for a reason – they are often uncontrollable. What is controllable, however, is the preparation you can undertake to protect your home or business from damage and losses when a wildfire threatens. Ultimately, the difference between survival and destruction is whether some part of the building catches on fire.

There are two primary areas of concern when it comes to limiting ignition from exposure to a wildfire. First, a number of features, materials and design details of the structure itself can make it vulnerable to a wildfire. Second, the surrounding wildlands and vegetation near your home or business can provide a pathway for an approaching wildfire to get close enough to for flames touch the structure, radiant energy (like standing in front of a camp fire) to preheat or ignite your structure, or embers from a fire a mile away may fall onto the structure and cause it to catch fire.

### MANAGING YOUR HOME OR BUSINESS:

The most vulnerable part of your structure is the roof. If you have a flammable roof, almost anything else you do will be of little consequence in reducing the chances the structure will burn when a wildfire approaches. Other key risk factors include vents that can allow embers to enter the attic; fences and decks that can ignite and bring a fire right up to the building; single-pane windows that can shatter and allow flames and embers inside, and debris that collects in gutters and in various locations along the roof and wall lines. This guide





provides ideas for reducing the ignition risks by making improvements to your home or business.

## MANAGING VEGETATION AND FUEL SOURCES AROUND YOUR HOME OR BUSINESS

Fire officials recommend a vegetation management zone around your structure of at least 100 feet or more, depending on the type of vegetation in wildland areas adjacent to the structure and the slope of the land around it. The actions you take to modify the vegetation in this area are intended to reduce the severity of the fire. This also reduces the chances that flames will come into direct contact with any part of the structure or radiant energy from the high-intensity flames will be sufficient to break the glass in windows or cause other surfaces to catch on fire. Regardless of the size of the land surrounding a home or business, the goal is the same: to reduce the amount of fuel that can bring a wildfire dangerously close to your door. This zone, which is widely referred to as “defensible space,” creates a safer area for firefighters to try to keep the wildfire at bay and help stop the flames from actually reaching your home or business.

## IMPROVING YOUR STRUCTURE’S WILDFIRE RESISTANCE

You probably already have a list of property improvement projects, both large and small. Maybe you need a new roof, want to replace old windows or doors with new energy-efficient models, or need to rebuild a deck or porch. As your first step, review your list to see if it includes projects in any of the following building-related sections. If so, by slightly modifying your project plans, you may be able to simultaneously improve the condition of your home or business, add to its value and reduce your risk of wildfire damage. You also may decide to add new projects to the list, ones that can both provide vital protection against wildfire and, in some cases, save money on energy bills.

# ROOF

---

## WHAT YOU SHOULD KNOW

Replacing a roof is a major project, but it also yields major benefits. The roof should be your first priority. Research has shown that combustible roof coverings are the greatest threat to a structure during a wildfire. Roof combustibility is described by a UL (Underwriter’s Laboratory) rating system – with a Class “A” being the least combustible based on ember tests. Roof shape also plays an important role. Take a careful look at your roof. If you have a lot of ridges and valleys, or roof segments that intersect with the walls of the structure, you have a complex roof. This makes your structure more vulnerable to wildfires even if you have a Class “A” roof because vegetative debris readily accumulates in these intersection areas and so can burning embers. When the resulting fire is next to combustible siding or a dormer window it can cause the structure to catch fire.

## WHAT YOU SHOULD DO

Always keep your roof clean of debris.

It can be difficult to tell whether you have a Class “A” fire-rated roof, unless it’s made of an obviously noncombustible material, such as tile. If you are not sure about your roof, schedule a professional roof inspection to find out. If you





replace your roof, choose a Class “A” rated roof, and completely remove the old covering.

Regardless of the specific Class “A” roofing material that you choose, inspect it regularly, maintain it when necessary, and replace it when needed.

Here are some things to keep in mind when choosing a Class “A” roof covering:

- Many roof coverings have a Class “A” rating based only on the top/external part of the roof that you can see. Some common examples include asphalt composition fiberglass shingles, steel, and clay or concrete tiles. Asphalt composition shingles also can use organic fibers instead of fiberglass, which would result in a Class “C” fire rating.
- Other roof coverings obtain their Class “A” rating because additional materials are used in the roof assembly to enhance fire resistance. The assembly is the underneath part of the roof that you can see. These coverings are considered “Class ‘A’ by assembly.” Examples include aluminum, and some newer composite roofs made from recycled plastic and rubber materials, which require other layers of noncombustible materials to achieve a Class “A” rating. Wood shakes also are now available with pressure-impregnated, exterior-rated, fire-retardant chemicals that provide a Class “B” fire rating, and a “Class ‘A’ by assembly.”
- It is important to note that most roofing products and assemblies are tested with new materials when they receive their rating. One exception is wood shakes, which are subjected to a natural weathering protocol prior to roof fire testing. One important thing to note is that over time as the products weather, both wood shake and shingle roofs may become more vulnerable to fire.

## EAVES, SOFFITS, AND ATTIC AND CRAWLSPACE OPENINGS

### WHAT YOU SHOULD KNOW

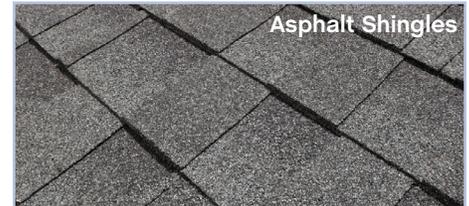
Researchers have learned from post-fire surveys of buildings damaged and destroyed by wildfires that attic/roof and foundation vents are entry points for embers and flames. Among the most vulnerable are vents in the eave and soffit areas, but there also are risks associated with the most common type of eave, known as open (or exposed) eave construction, which does not have vents. You have this type of construction if you can see the rafter tails from your roof framing on the exterior underside of your roof. If not properly installed, there can be gaps where the blocking and rafter tails intersect; as a result, wind-blown embers could become lodged here and ignite.

### WHAT YOU SHOULD DO

If you have vented openings into your attic or crawl space, check for screening. At a minimum, these vents should be covered with 1/8-inch metal mesh screens (usually the finest mesh allowed by the building code). Post-fire surveys have shown that embers large enough to cause ignitions can pass through 1/4- and even 1/8-inch mesh screening, so whereas screening will help, it won't be the



Wood Shake



Asphalt Shingles



Barrel Tile/Complex roof

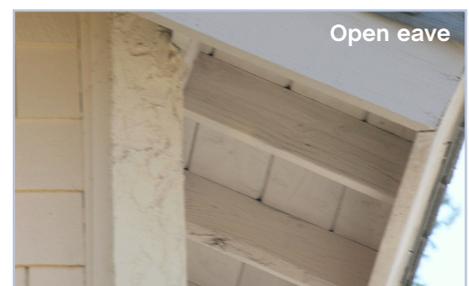
Wood shake roofs are now available with chemical treatments that provide a Class “B” fire rating.

Asphalt shingles are available with Class “A” fire ratings, but also may use organic fibers that can result in a Class “C” rating with less fire resistance.

Tile roofs must be kept clear of debris and the ends blocked to avoid allowing embers to override the Class “A” fire rating abilities.



Boxed eave



Open eave



perfect answer. Also, keep in mind that while a finer mesh screen will offer better protection against embers, it also requires more maintenance to be kept free of debris. It is important to keep air flowing freely to help manage the moisture in your attic.

Property owners in every area vulnerable to wildfire can benefit from new vents being designed as a result of stricter building codes in California. Although these vents may not be required in your state, they are designed to offer enhanced protection by reducing the chance embers will enter your space. These products are currently in the testing and acceptance phase. Find a list of accepted vents at: <http://osfm.fire.ca.gov/> Scroll down to the section titled Building Code Chapter 7A Wildfire Protection Information & CBC Chapter 7A Task Force.

If you have open eaves (i.e., you can see the exposed rafters in the eave of your home or business), you can enclose the underside of the roof overhang to help keep embers from lodging there. To do this, fasten sheathing made from a noncombustible or fire-resistant material to the underside of the rafter tails. This enclosure can follow the slope of the roof, and is sometimes referred to as boxing-in the eave. This can also be accomplished by extending the material from the roof edge horizontally to the exterior wall, thereby making a soffit eave. If you have a vented attic, don't forget to add soffit vents as part of your project – position the vents close to the roof edge, not the exterior wall.

## TILE AND OTHER NONCOMBUSTIBLE ROOF COVERINGS WITH GAPS ALONG THE EDGES

### WHAT YOU SHOULD KNOW

Some roofing materials have a gap at the ridge and edge of the roof. The most common example is a clay barrel tile roof covering, but it also occurs in some metal roofs (mainly shingle style) and other cement roof coverings. The gaps can allow birds and rodents to get into the opening and build nests. The small bits of vegetation used for nesting material are highly combustible, and easily ignited by wind-blown embers. The flames can then quickly spread to the structural members that support your roof and bypass any protection offered by Class A fire-rated roof covering materials.

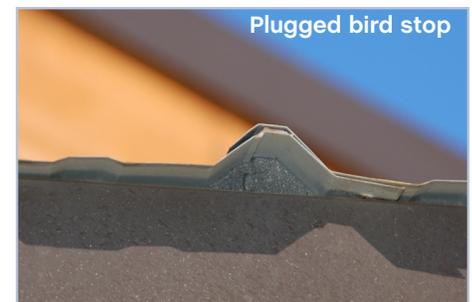
### WHAT YOU SHOULD DO

Use a form of protection called a bird stop to seal the open edges of the roof covering. Bird stops are a manufactured shield that can be purchased from roofing supply stores and are typically provided by the manufacturer of the roof covering. The bird stop is inserted into the opening at the edge of the roof. You can also use a mortar mix to plug the ends. The mortar mix would be the best option for openings at the ridge of the roof. Remember, the idea is to keep fuel sources (such as nesting materials, and wind-blown debris) and embers from getting under the roof covering.

Don't forget to inspect the ridge (peak) of your roof. A flat tile roof may not have a gap at the roof edge, but it could have openings at the ridge. These openings also need to be closed.



Bird stop (missing)



Plugged bird stop



## GUTTERS

### WHAT YOU SHOULD KNOW

Wind-blown vegetative debris and overhanging trees can lead to the accumulation of leaves and needles on the roof and in gutters. Once dry, this debris can be readily ignited by embers from a wildfire. Debris accumulated in gutters and at roof-to-wall intersections are both particularly vulnerable to ignition by wind-blown embers.

Even if you have a Class “A” fire-resistant roof covering, such as tile, concrete or asphalt composition shingles, the roof edge, and in the case of a multistory structure or one with dormers, the exterior siding adjacent to the roof, will be exposed to flames from the ignited vegetative debris.

Many check lists suggest replacing vinyl gutters with metal gutters. Debris in any gutter will be readily ignited by embers. Depending somewhat on the amount of accumulated debris, a vinyl gutter will likely quickly detach from the fascia due to deformation from the heat or flames and fall to the ground. The debris will burn out on the ground, potentially igniting any other vegetation or combustible siding. The metal gutter will remain attached to the fascia, and the ignited debris will burn out there, continuing to expose the edge of the roof. The most ‘fire safe’ solution is to minimize the build-up of debris in the gutter.

### WHAT YOU SHOULD DO

Remove tree branches that overhang the roof and remove any dead vegetation, including branches, within your defensible space, the zone where you are actively managing your vegetation. This should be part of your routine defensible space maintenance. Do this at least once each year, at a time best suited for the health of the tree or plant.

Clean gutters and roof areas where debris collects. Inspect these areas at least twice a year. Remove accumulated leaves, pine needles and any other combustible debris.

Covering your gutters with screens or other cover devices can minimize the build-up of debris in the gutter. Remember that even gutters with screens should be inspected to make sure covers are still in place and performing properly. Some screens and cover devices will keep debris out of the gutter, but allow it to accumulate on the roof, behind the device. If ignited, this amount of debris won’t be a problem for a Class “A” roof but can increase your vulnerability if you don’t have a Class “A” roof. Even if you have a Class “A” roof, debris should still be removed on a regular basis to reduce ember generation and exposure to other building components.





## WINDOWS AND DOORS

### WHAT YOU SHOULD KNOW

The doors and windows of any structure should be able to resist wind-blown embers and protect against radiant heat and flame exposures. Depending on the type of glass, a window that is exposed to flames may break after only 1 to 3 minutes of exposure to intense heat or flames. When windows break from exposure to heat and/or flames, embers and flames can get inside the structure. Testing has shown that single-pane windows are highly vulnerable to breaking when exposed to wildfire conditions. Fortunately, dual-pane windows provide better protection; this protection is even greater when tempered glass is used. Remember, even dual-pane, tempered glass windows will not protect your home or business if they are left open. So, close all windows before you evacuate during a wildfire.

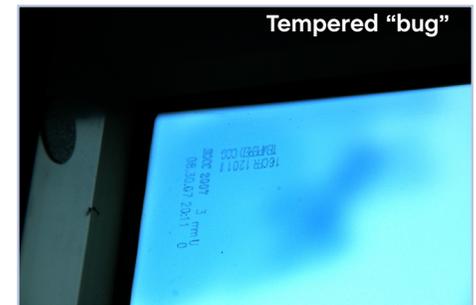
Glass in windows breaks because of extreme temperature differences that develop between the exposed glass, and the glass protected by the window framing material, when exposed to the heat from a wildfire (or the heat from your neighbor's property that has ignited). Cracks develop at the edge of the glass. Because larger windows have more edge, large windows are more vulnerable to breaking than smaller ones. Studies have shown that the glass is the most vulnerable part of the window (i.e., the glass is more vulnerable than the frame).

### WHAT YOU SHOULD DO

Determine what kind of windows are in your building. Single-pane windows are more common in older buildings, while dual-pane windows are more frequently found in newer construction. Dual-pane windows have two sheets of glass that are separated by airspace. To find out if your dual-pane windows contain tempered glass, look for an etching (called a bug) in the corner.

You should replace your single-pane windows with dual-pane windows that have at least one pane of tempered glass (if only one pane of the dual-pane window is tempered, it would be best to have the tempered pane on the outside). Dual-pane windows without tempered glass don't protect as well in wildfire conditions. Current energy code requirements usually require dual-pane windows, so changing your single-pane window to dual-pane will help with both fire-resistance and energy efficiency.

If you cannot afford to replace your windows but have managed the fuels close to your property, including vegetation, mulch and yard structures, a less expensive alternative is to make shutters out of ½-inch plywood. Cut them to size and label them for each window so they can be installed quickly when wildfire threatens. Take the time to pre-install the anchorage hardware and prepare your shutter materials in advance. The ½-inch plywood will provide an extra measure of protection from radiant heat or the impact of wind-blown embers.



The outer pane of this dual-pane window broke during a 2007 wildfire. Having the dual-pane window was one reason why this home survived.

Tempered glass in a window will have a marking etched on one of the corners, similar to that shown here.



## DECKS, PORCHES AND PATIOS

### WHAT YOU SHOULD KNOW

Decks, patios and porches are important because they often are attached to the house or business and are next to windows, sliding glass doors, and possibly combustible siding. Consider the construction material used to build the deck, patio or porch, along with the types of items that are on and beneath it. This includes vegetation leading up to the structure, which can act as a wick and move the fire through to the building materials, igniting it and other items stored underneath or nearby. This is particularly important for decks when the house or business is sited on a sloped lot. Depending on the type and condition of the vegetation, flame lengths on a slope can reach more than 30 feet, so even an elevated deck can be vulnerable.

It is common knowledge that wood deck boards are combustible. There is sometimes a misunderstanding regarding the combustibility of wood-plastic composite decking products. These products also are combustible; some manufacturers are now incorporating fire retardant chemicals into their products, and fire performance information for many decking products is now available online at the manufacturer Web site. Wood decking that has been treated with an exterior fire retardant also is available.

Some checklists and guides suggest attaching a metal flashing strip, approximately 18 inches tall, between the top of the deck, patio or porch and the exterior (combustible) siding. The purpose of the flashing strip is to provide protection from ember exposure, both the embers themselves and the flaming exposure that could occur if accumulated debris at the point where the house or business intersects with the deck, patio or porch were ignited by the embers. This is a good idea, as long as the flashing is tucked in behind the siding where the top of flashing terminates so water cannot seep between the flashing and the siding.

### WHAT YOU SHOULD DO

Enclosing your elevated deck, patio or porch can help reduce the risk of damage from wildfire. These can be enclosed vertically by applying an exterior siding product around the edge of the deck, patio or porch or horizontally by applying an exterior panelized product to the bottom of the support joists.

To determine if enclosing your deck, patio or porch would be beneficial, consider whether you store combustible materials underneath it, or if your vegetation management plan is inadequate, particularly in the 0- to 30-foot zone. If you can avoid storing combustible materials underneath and if you create and maintain your vegetation management plan, enclosure will not significantly increase the protection of your house or business from wildfire.

If you choose to enclose your deck, patio or porch make sure you provide sufficient ventilation or other means for water to drain out. The building code requirement for a crawlspace is one square foot of venting for each 150 square feet of floor area. You should have at least this much ventilation and maybe more if you are in a particularly wet area. If you do not allow the structural



Use noncombustible materials when building a deck. Never store flammable materials on top of or beneath the deck.

support members and boards to dry out, fungal decay will become the biggest threat to your deck, patio or porch.

Enclosing your deck, patio or porch will not reduce the risk of the top being exposed to embers. For that, the best protection is to keep the surface clear of leaves, pine needles and other vegetative debris. If your house or business is supported by a column and beam system, and it doesn't have skirting around the perimeter, add a skirting of an ignition-resistant material. Remember to provide vents on all sides to ensure proper ventilation.

Learn more about how to choose wildfire-resistant decking materials at: [http://www.fire.ca.gov/fire\\_prevention/fire\\_prevention\\_wildland.php](http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php).

## SIDING

### WHAT YOU SHOULD KNOW

Siding can be vulnerable for two reasons. First, if ignited, combustible siding can provide a path for flames to reach other vulnerable components of your structure, such as windows and the eave area. Second, if penetrated, a horizontal or vertical lap joint can provide access for flames to enter the building. Penetration at lap joints is more likely with combustible siding products, but can occur in noncombustible siding products as well.

Large logs used to side homes will resist ignition better than smaller members typically used for wood siding products. The most vulnerable part of a log wall is the space between joints, but this risk is minimized if the space is filled with "chinking" that provides protection from flame penetration. Wood siding with a more complicated lap joint, such as tongue-and-groove or shiplap, offers better resistance from flame penetration into the stud cavity.

Vinyl siding will deform and fall off the wall at relatively low radiant energy or flame exposure during a fire. In these cases, protection of your home will depend on the performance of the underlying sheathing material.

Noncombustible siding, including fiber cement, traditional 'three-coat' stucco, and brick, will provide the best protection. Wood siding that has been treated with an exterior-rated fire retardant chemical will also improve the performance of siding against wildfire exposure.

### WHAT YOU SHOULD DO

If you have combustible siding, consider incorporating a noncombustible zone next to your home or business. In order to best resist fire penetration at lap joints, plain lap joints should be avoided, or exterior-type fire retardant treated siding should be used. If you have a chinked-style log structure, inspect the chinking for cracks and missing pieces. Repair and replace with fire-resistant chinking.

Replacing siding is expensive and there are other, less expensive items already discussed in this guide that will provide more protection.





## FENCES

---

### WHAT YOU SHOULD KNOW

Fences can be a wildfire hazard, particularly if they connect directly to the structure. The bottom of fences collect debris that, when combined with combustible fencing materials, become a fuel source that can act as a wick to carry fire directly to the building.

Some checklists recommend inserting a metal shield where the fence connects to the exterior (combustible) siding. How effective this will be will depend on the size of the metal. Also, depending on how it is attached, over time it could also result in other moisture-related problems with the siding. Find more in the following section.

### WHAT YOU SHOULD DO

New fences should be entirely constructed of noncombustible or other fire-resistant materials. A wood frame with steel mesh infill is another option that will provide adequate protection. Existing wood fences that are attached to the structure should be retrofitted so the fence ends with a noncombustible material like masonry or metal, or with a larger wood member (i.e., heavy timber) to keep fire from spreading. A common technique is to use a metal gate that is attached to the fence on one side and to the exterior siding on the other side.

It is important not to store firewood or other combustible materials against the fence, and to regularly remove debris and dead vegetation at the bottom of the fence.

## CHIMNEYS AND BURN BARRELS AND OPEN DEBRIS BURNING

---

### WHAT YOU SHOULD KNOW

Spark arrestors are required to prevent large embers from escaping through your chimney. Think of it as a community-wide approach to wildfire protection – you protect your neighbors and they protect you by having a chimney spark arrestor.

The spark arrestor concept also applies to burning debris and garbage in an open barrel. Embers generated during burning can result in ignitions in adjacent woodlands. Fire also can escape when doing debris burning in open piles.

### WHAT YOU SHOULD DO

Install a spark arrestor that has ½-inch mesh. These are available at lumber yards, hardware stores or fireplace specialty stores.

In the case of burning in barrels, a heavy metal screen with ½-inch mesh should be placed on top of the barrel. Debris also should be cleared from the area immediately surrounding the barrel. Care should always be taken when conducting open backyard debris burns to stop fire from escaping into the



Use metal gates and noncombustible materials when installing or replacing a fence.

wildland. State and local ordinances may require a permit for open burning. Contact your local fire department for information.

Follow these guidelines for safe debris burning:

- Clear a safe zone that is wide enough to prevent the escape of fire.
- Keep a supply of water and a rake or shovel readily accessible.
- Stay with the fire until it is completely out and never leave a fire unattended.
- Burn only when the wind is calm and the humidity level is high.
- Extinguish fire completely if conditions become windy.
- Keep brush piles small to allow quick control of the fire if necessary.
- Locate brush piles an adequate distance from structures and utilities.
- Obey all outdoor burning laws including forest fire laws, air pollution, open burning regulations, and local ordinances.
- Understand that you are liable for damages and cleanup if the fire escapes.

## CREATING DEFENSIBLE OR DEFENSIVE SPACE

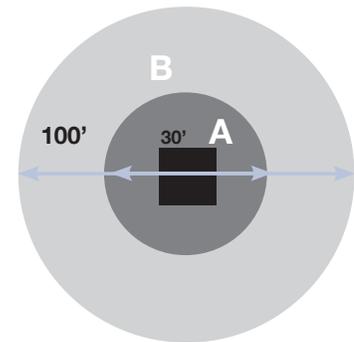
### IDENTIFYING FUEL MANAGEMENT ZONES

The zone closest to your home or business extends outward at least 30 feet (or to the property line). This zone will require the most thinning and (horizontal) separation of trees and other vegetation and removal of items that could cause a very intense, close fire. The objective of the thinning and separation in this zone is to reduce the chance that vegetation will provide flames a direct path to your home or business. The other kinds of items to be removed include wood structures, boats, RV's and other combustible items that could create a very intense fire.

The next zone extends from 30 feet to approximately 100 feet (or to the property line). If your home or business is located on a steeper slope (more than 1-foot drop for every 5 feet you move away from the structure), then this zone should be increased. Trees and other vegetation here should be maintained and dead plant materials and tree branches should be removed. The objective of the work in this zone is to slow down and reduce the energy of the wildfire.

If you are in a forested area, there is a risk that a wildfire could spread to the tops of the trees. By making modifications in the 30 to 100 foot zone such as increasing the separation between trees and vegetation and eliminating tree branches located close to the ground, you can help drive the wildfire back to the ground. These improvements also will help to reduce the chance that a fire will climb back up into the crown of the tree. Once created, it's critical to maintain these improvements.

Because of the importance of the area closest to your home or business, some experts suggest an additional zone that extends from 10 to 15 feet from the building. In high risk areas such as chaparral, this extra attention needs to be extended throughout the full 30 foot zone. Pay particular attention to the types of vegetation and mulch you select for this area. Whatever types of plant materials are chosen, they must be carefully maintained. There are products on the market such as noncombustible mulches, including rock, gravel, and noncombustible hardscape features such as brick and concrete walkways



Defensible space involves two zones extending out from a home or business.



and surfacing that will reduce your wildfire exposure. Choosing low-growing, irrigated herbaceous plant materials is another good option.

## THE AREA CLOSEST TO YOUR STRUCTURE (0 TO 30-FEET)

Take stock of what surrounds you. Consider the plants but look beyond them to other items that could increase the risk that your building will catch on fire. People frequently forget to look beyond the plants.

## PLANTS

### WHAT YOU SHOULD KNOW

Close to the building, plants can become a major fire hazard. Plants adjacent to combustible siding, as well as plants under or next to windows or the interior corners present the greatest hazard. Embers from a wildfire can reach the building from a mile or more away, and can become trapped in corners, igniting nearby plants and exposing siding and the roof overhang to flames.

### WHAT YOU SHOULD DO

Remove dead vegetation close to the home or business, paying attention to material on and underneath plants. Mulch can help keep the ground moist and reduce the need for watering, but it also can become a fire hazard. Avoid using wood, bark and rubber mulch products, particularly small pieces of bark. Consider rock mulch or other noncombustible materials. For plants, shorten the height, remove branches that are close to the ground, prune to reduce the amount of material in the plant, and remove dead material.



Palm trees act as torches once ignited.

### BETTER VEGETATION CHOICES FOR YOUR AREA

Choose fire-resistant plants. Learn more about choosing plants, and community-based programs by visiting the links at [DisasterSafety.org/megafires](https://DisasterSafety.org/megafires) or directly at:

#### Arizona

<http://ag.arizona.edu/pubs/garden/az1153.pdf>

#### New Mexico

[http://www.co.santa-fe.nm.us/resident/documents/Wui\\_plantlist.pdf](http://www.co.santa-fe.nm.us/resident/documents/Wui_plantlist.pdf)

#### Oklahoma

<http://www.forestry.ok.gov/firewise-plant-list>

#### Nevada

<http://www.unce.unr.edu/publications/files/ho/2001/fs0133.pdf>

#### East Texas

<http://www.circleoaks.org/fire/Firewise%20Recommended%20Plants.pdf>



## YARD STRUCTURES

### WHAT YOU SHOULD KNOW

Arbors, pergolas or trellises, combustible fencing, playground equipment, gazebos and other structures located close to your home or business will increase its vulnerability to wildfire. Wind-blown embers can accumulate in or on such structures and ignite them. Depending on how close the items are to vegetation or your structure, they might be ignited by direct contact with flames. Trellises and pergolas are especially susceptible, since they are often made of wood, are covered with vegetation, and attached or adjacent to the structure.

### WHAT YOU SHOULD DO

Consider removing arbors or pergolas made from combustible materials. Structures made from metal and other noncombustible materials would be acceptable choices. Wood arbors and pergolas can be more resistant to fire if they are made with exterior-rated, fire retardant lumber, or larger dimension material. If you go this route, you should also use the heartwood of a naturally durable species (such as cypress or cedar). Consider mixing materials: the supporting structural members could be large timbers and the smaller members could be noncombustible. Don't forget to remove dead vegetation on these structures. Keep all yard structures free of accumulated debris. Any structures, such as a child's play set or gazebo, built from combustible materials, should be relocated at least 30 feet away from the structure.



Wooden playground equipment can be a fire risk if located too close to a home or business.

## OUTBUILDINGS, FUEL TANKS AND FLAMMABLE PERSONAL PROPERTY

### WHAT YOU SHOULD KNOW

All buildings on the property face the same types of risks when it comes to wildfire. Once ignited, buildings will act just like a large plant, bringing flames closer to the main structure, potentially resulting in ignition. If ignited, outbuildings will burn much longer than a typical plant, resulting in a longer fire exposure for your home or business. They will also generate their own embers. Boats, RV's and other personal property can also burn very intensely. They should be protected inside a building or parked at least 30 feet from the structure.

If fire comes too close to exterior liquefied petroleum (LP) tanks, a leak can develop at the valve, and the tank can explode. So, it's important to locate propane tanks at least 30 feet from your structure, and create a 10 to 15 foot 'defensible space' around your tank.



Locate propane tanks at least 30 feet from a home or business and create defensible space around the tank.



## WHAT YOU SHOULD DO

Relocate combustible outbuildings at least 30 feet away. Other options would be to create defensible space around the outbuilding, just as you did with your home or business, or incorporate noncombustible or fire-resistant materials into the building.

If necessary, relocate your propane tanks so that it is at least 30 feet from the structure. Create a noncombustible zone within 10 feet of the tank. Another option is to enclose the tank. If enclosure is used, it should be made of noncombustible materials (i.e., fiber cement siding, stucco, or metal.)

## FIREWOOD, LEFTOVER MATERIALS AND COMBUSTIBLE MULCH

---

### WHAT YOU SHOULD KNOW

It may seem obvious, but firewood, combustible mulch, or other combustible materials located too close to a home or business can be factors in spreading wildfire. Mulch offers several beneficial attributes to the soil, including weed and erosion control and water retention. Balancing the benefits of mulch with the potential risk from spreading fire to the building must be carefully considered.

The ease with which combustible mulches ignite, and the rate fire will spread, will depend on the characteristics of the particular mulch, but they will all burn. Mulches that are smaller, or have 'fine fuel' components (for example, the 'hairy bark' or needle mulches), will ignite and spread fire more quickly. Studies have shown that composted mulches perform better than other combustible mulches, but this material exhibits smoldering combustion. Learn more by reading the University of Arizona Cooperative Extension Service's study "Comparing the Ignitability of Mulch Materials for a Firewise Landscape." The link is available at [DisasterSafety.org/megafire](https://DisasterSafety.org/megafire).

### WHAT YOU SHOULD DO

Move firewood and leftover building materials, and items such as wheelbarrows containing these materials, as far away from your building as possible. Firewood piles should be located at least 30 feet from any structure. Consider using noncombustible mulches in the area immediately adjacent to your home or business.



## ASSESSING AND MANAGING SURROUNDINGS BEYOND 30-FEET: VEGETATION MANAGEMENT

---

### WHAT YOU SHOULD KNOW

If your home or business faces a wildland and you own or can get access and permission to modify the vegetation in the area between 30-feet and 100-feet, your goal is to reduce the intensity of the fire in this area and make sure that it at most is a ground fire.

### WHAT YOU SHOULD DO

You should regularly remove any dead brush from this extended fuel modification area and thin out trees, including removing branches close to the ground so that a crown fire cannot be supported and a fire on the ground will not climb up into the tree canopy.

## IMPORTANCE OF TOPOGRAPHY

---

### WHAT YOU SHOULD KNOW

Southern California is known for its canyons, hilltops and valleys, but these beautiful features also can put your house or business at increased risk of wildfire. The topography around your house or business, which includes the slope of the land and the direction the structure faces, is a major consideration in assessing the risk exposure to wildfire. Wildfires burn up a slope faster and more intensely than along flat ground. A steeper slope will result in a faster moving fire, with longer flame lengths.

### WHAT YOU SHOULD DO

Determine the slope of your structure. Select a mark on the slope and walk 10 paces downhill. If your head is below the mark you have a steep slope.

If your house or business is mid-slope or at the top of a steep slope, but set back less than 15 feet for a single-story and 30 feet for a two-story house, take additional precautions. These include being more aggressive with your vegetation modification and maintenance plan and more aware of the materials used to build the house, deck or any outbuildings. You will also want to push the fuel modification area beyond the 100-foot length if at all possible. A target for the extended fuel modification area would be between 150 and 200 feet.

Consider increasing the protection of your house or business by constructing a noncombustible retaining wall to help increase the set back. When making future improvements incorporate ignition-resistant features and materials into the house or business and surrounding landscape.





## **IMPORTANCE OF ENVIRONMENTAL CONDITIONS**

---

### **WHAT YOU SHOULD KNOW**

Higher wind speeds are frequently associated with fast moving wildfires. Strong winds blowing a fire toward your house or business will have the same effect as being located on a slope; the fire will move faster and burn more intensely, blowing embers in front of the fire. The flame lengths also will be longer.

### **WHAT YOU SHOULD DO**

If your house or business is located on the side of a development that faces into the prevailing strong wind direction or on a side that is parallel to the prevailing strong wind direction, consider pushing the fuel modification area beyond the 100-foot length if at all possible. A target for the extended fuel modification area would be between 150 and 200 feet.

## **DEFENSIVE ACTIONS**

---

### **WHAT YOU SHOULD KNOW**

Some states, including northern Minnesota, have been given grants from the Federal Emergency Management Agency (FEMA) for the installation of exterior roof-mounted fire sprinklers. The use of exterior sprinklers is considered a defensive action and a primary use is to help limit the spread of the fire to the home or business. The sprinklers would be turned on prior to evacuation..

Using exterior sprinklers can help to reduce the chances of a home or business being damaged by a wildfire, but like all other actions that can be taken, it requires planning and the system must be maintained. It must also be treated as one component of a fire safe plan and it does not eliminate the need for other actions recommended in this guide.

### **WHAT YOU SHOULD DO**

If you are considering an external sprinkler system, check with your local fire department. They may have plans, and other suggestions. In order to maximize the effectiveness of exterior sprinklers, they should be on a stand-alone, independent water system (i.e., tank, pool, or lake) and must be attached to a pressurized delivery system or use a generator for needed pumps.

Separate water and power supplies will reduce the reliance on municipal power sources, which could be affected by the wildfire, and water sources that could be needed by firefighters to protect other properties.

**YOUR HOME  
OR BUSINESS**
**REQUIRED ACTION  
OR RETROFIT**
**RELATIVE  
COST**

**ROOF COVERING** - Your roof, both in terms of its covering and design, is the most vulnerable part of your home or business when considering exposure to wildfire.

1. Do you have a non-combustible or Class "A" roof?	A professional roof inspection can help determine this. If not, replace your roof covering with a Class "A" fire-rated covering. Many styles are available.	\$\$\$\$
2. Do you have a tile or metal roof? If yes, are the gaps between covering and roof sheathing, which can occur at the edge and ridge, filled with either a bird stop or other material to seal the openings?  Are there other roof openings?	Install bird stops.  Plug any roof openings that are not functioning as vents.	\$-\$
3. Do you have combustible siding where a lower level roof meets and on the upper level roof or wall?	Replace siding with a more fire-resistant material.	\$\$-\$\$\$\$
4. Has vegetative debris accumulated on your roof?	Ember accumulation at the roof-wall intersection increases the risk of fire exposure, particularly if combustible siding is present. The problem is exacerbated with a buildup of debris. Routinely remove debris from the roof. Consider hiring a professional to help with this task.	FREE

**VENTS** are vulnerable to wind-blown embers and flames from nearby vegetation, combustible siding that has ignited or if combustible materials are stored nearby that could potentially catch on fire. Maintaining appropriate defensible space will help minimize wildfire risks.

1. Are your vents covered with 1/8-inch mesh metal screens?	There are many types of new vents on the market that are designed to reduce the risks of wind-blown embers getting inside. Consider installing new vents; availability and styles will vary by region. A less expensive alternative is to attach a minimum of 1/8-inch mesh metal screens over existing vents.	\$
2. If your vents are not covered with metal screens, have you attached 1/8-inch mesh metal screens and have you prepared vent covers that can be easily installed when a wildfire is approaching?	Attach screens and/or prepare covers. Attaching a solid cover would provide additional assurance that large embers would be kept out of the attic or crawlspace. Since the primary purpose is to prevent embers from getting inside your vents, 1/2-inch plywood could be used. Keep the areas around the vents clear of vegetation and other combustible materials. Install covers before evacuation and remove them upon your return. Use caution when installing and removing covers over vents on higher floors.	\$



















Institute for Business and Home Safety  
4775 E. Fowler Avenue, Tampa, FL 33617  
E-mail: [info@ibhs.org](mailto:info@ibhs.org) | Voice: (813) 286-3400  
Web site: [DisasterSafety.org](http://DisasterSafety.org)

